AMENDMENT

In the Claims

Please amend claims 1-3 and 5-7 as follows.

1. (Currently Amended) A method to express a topological structure of an object in an image including a plurality of binary branches, comprising:

tracing ~~a topology of the object, the topology comprising a structure including a~~ the plurality of binary branches; and

~~simultaneously~~ as the plurality of binary branches are traced, generating an extended markup language (XML) ~~elements to generate an XML document~~ file including elements and having a nesting structure describing the topology structure of the object.

2. (Currently Amended) The method of claim 1, ~~where the tracing of the topology further comprises~~ further comprising:

generating a bitmap skeleton of the object;

generating an empty XML file;

tracing the bitmap skeleton from [[at]] a suitable end point on the skeleton;

recursively selecting adjacent pixels of the bitmap skeleton to identify lines, nodes and endpoints; and

adding line and grouping elements to the XML file based on the lines, nodes and endpoints that are identified ~~when either 0 or 2 neighboring pixels are encountered~~.

3. (Currently Amended) The method of claim 2 where the adding of line and grouping elements to the XML file further comprises:

adding a line element as a child of a grouping element;

adding a transform attribute to the grouping element with rotation and translation properties, wherein the translation value is indicative of the length of the parent line and

the rotation values is indicative of an [[the]] angle the parent line would be rotated to align with the child line; and

adding an attribute to the line element with a value equal to the length of the child line.

4. (Original) The method of claim 1, wherein the XML file that is generated is used to store attributes representing physical properties of the topology structure without requiring a location referencing system.

5. (Currently Amended) A computer-readable medium having instructions stored thereon, which when executed express a topological structure of an object in an image including a plurality of binary branches by performing operations, including:

tracing ~~a topology of the object, the topology comprising a structure including a~~ the plurality of binary branches; and

~~simultaneously~~ as the plurality of binary branches are traced, generating an extended markup language (XML) ~~elements to generate an XML document~~ file including elements and having a nesting structure describing the topology structure of the object.

6. (Currently Amended) The computer-readable medium of claim 5, wherein execution of the instructions ~~traces the topology of the object by performing the further operations of~~ further performs operations including:

generating a bitmap skeleton of the object;

~~generating an empty XML file;~~

tracing the bitmap skeleton from [[at]] a suitable end point on the skeleton;

recursively selecting adjacent pixels of the bitmap skeleton to identify lines, nodes and endpoints; and

adding line and grouping elements to the XML file based on the lines, nodes and endpoints that are identified ~~when either 0 or 2 neighboring pixels are encountered~~.

7. (Currently Amended) The computer-readable medium of claim 5, wherein execution of the instructions performs the adding of line and grouping elements to the XML file by performing the further operations of:

adding a line element as a child of a grouping element;

adding a transform attribute to the grouping element with rotation and translation properties, wherein the translation value is indicative of the length of the parent line and the rotation values is indicative of the angle the parent line would be rotated to align with the child line;

adding an attribute to the line element with a value equal to the length of the child line.

8. (Original) The computer-readable medium of claim 5, wherein the XML file that is generated is used to store attributes representing physical properties of the topology structure without requiring a location referencing system.

Please add the following new claims 9-19:

--9. (New) The method of claim 2, wherein the bitmap skeleton comprises a bitmap having a foreground color defining skeleton pixels and a background color, and wherein lines, nodes, and endpoints are identified by performing operations comprising:

determining, for a current pixel, a number of neighbor pixels having a foreground color; and

if the number of neighbor pixels having a foreground color is one, setting the current pixel to a background color and selecting the neighbor pixel with the foreground color as a new current pixel.

10. (New) The method of claim 9, further comprising:

if the number of neighbor pixels having a foreground color is two,

identifying the current pixel is a node;

setting the current pixel and each of the two neighbor pixels with the foreground color to the background color;

starting at a first of the two neighbor pixels, recursively selecting adjacent pixels to trace a path of a first branch connected to the node; and

starting at a second of the two neighbor pixels, recursively selecting adjacent pixels to trace a path of a second branch connected to the node.

11. (New) The method of claim 9, further comprising:

if the number of neighbor pixels having a foreground color is zero,

identifying the current pixel as an endpoint of a line; and

adding an attribute in a corresponding element in the XML file indicative of a length of the line.

12. (New) The computer-readable medium of claim 6, wherein the bitmap skeleton comprises a bitmap having a foreground color defining skeleton pixels and a background color, and wherein execution of the instructions identifies lines, nodes, and endpoints by performing operations including:

determining, for a current pixel, a number of neighbor pixels having a foreground color; and

if the number of neighbor pixels having a foreground color is one, setting the current pixel to a background color and selecting the neighbor pixel with the foreground color as a new current pixel.

13. (New) The computer-readable medium of claim 12, wherein execution of the instructions further performs operations including:

if the number of neighbor pixels having a foreground color is two,

identifying the current pixel is a node;

setting the current pixel and each of the two neighbor pixels with the foreground color to the background color;

starting at a first of the two neighbor pixels, recursively selecting adjacent pixels to trace a path of a first branch connected to the node; and

starting at a second of the two neighbor pixels, recursively selecting adjacent pixels to trace a path of a second branch connected to the node.

14. (New) The computer-readable medium of claim 12, wherein execution of the instructions further performs operations including:

if the number of neighbor pixels having a foreground color is zero,

identifying the current pixel as an endpoint of a line; and

adding an attribute in a corresponding element in the XML file indicative of a length of the line.

15. (New) The computer-readable medium of claim 5, wherein execution of the instructions further performs the operation of enabling attributes indicative of physical characteristics of the object to be added to the XML file.

16. (New) A method to express a topological structure of an object in an image, comprising:

generating a bitmap corresponding to the image including a bitmap skeleton of the object;

tracing the bitmap skeleton from a suitable end point on the skeleton to identify lines, nodes and end points of the bitmap skeleton; and

adding line and grouping elements to an XML file in consideration of the lines, nodes and endpoints that are identified, where the adding of line and grouping elements to the XML file includes,

adding a line element as a child of a grouping element;

adding a transform attribute to the grouping element with rotation and translation properties, wherein the translation value is indicative of the length of a parent line and the rotation value is indicative of an angle between the parent line and the child line; and

adding an attribute to the line element with a value indicative of a length of the child line.

17. (New) The method of claim 16, wherein the bitmap skeleton comprises a bitmap having a foreground color defining skeleton pixels and a background color, and wherein lines, nodes, and endpoints are identified by performing operations comprising:

determining, for a current pixel, a number of neighbor pixels having a foreground color; and

identifying whether the current pixel corresponds to a line, a node, or an endpoint depending on the number of neighbor pixels having the foreground color.

18. (New) The method of claim 16, wherein selective branches of the bitmap skeleton may have a different width than branches of the bitmap skeleton, the method further comprising:

adding attributes to line elements of the XML file corresponding the selective branches indicative of a width of the selective branches.

19. (New) The method of claim 16, wherein the XML file may be rendered by an Scalar Vector Graphics (SVG) viewer to reproduce the object. --